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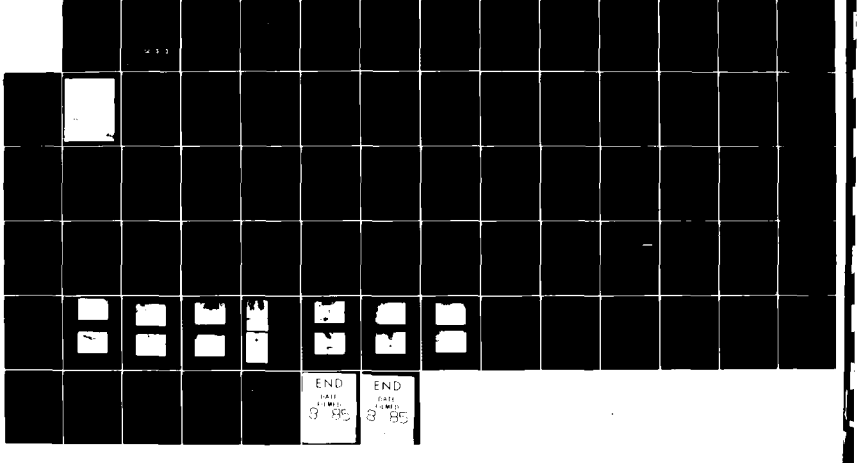

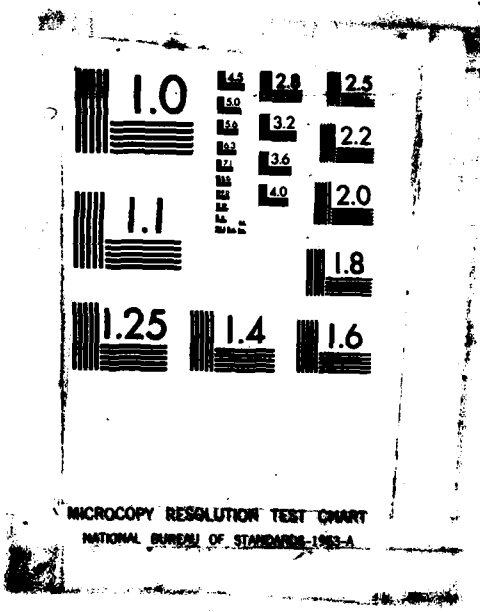
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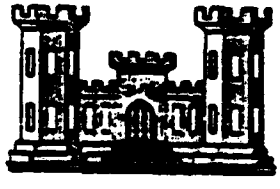
MERRIMACK RIVER BASIN
GROTON, MASSACHUSETTS

LOST LAKE DAM
MA 00808

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

JANUARY 1980

UNCLASSIFIED

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4. TITLE (and Subtitle): Lost Lake Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS	5. TYPE OF REPORT & PERIOD COVERED: INSPECTION REPORT
	6. PERFORMING ORG. REPORT NUMBER:
7. AUTHOR(s): U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION	8. CONTRACT OR GRANT NUMBER(s):
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Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Merrimack Rive Basin
Groton, Massachusetts
Cow Pond Brook

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The dam is about 80 ft. long and 10 ft. high. The size is intermediate with a hazard potential of high. The visual inspection indicated the dam to be in fair condition. The owner should institute various remedial measures which are listed in the report itself.

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REPLY TO
ATTENTION OF:
NEDED-E

JUN 04 1980

Honorable Edward J. King
Governor of the Commonwealth of
Massachusetts
State House
Boston, Massachusetts

Dear Governor King:

Inclosed is a copy of the Lost Lake Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. The report is based upon a visual inspection, a review of past performance, and a preliminary hydrological analysis. A brief assessment is included at the beginning of the report.

The preliminary hydrologic analysis has indicated that the spillway capacity for the Lost Lake Dam would likely be exceeded by floods greater than 3 percent of the Probable Maximum Flood (PMF), the test flood for spillway adequacy. Our screening criteria specifies that a dam of this class which does not have sufficient spillway capacity to discharge fifty percent of the PMF, should be adjudged as having a seriously inadequate spillway and the dam assessed as unsafe, non-emergency, until more detailed studies prove otherwise or corrective measures are completed.

The term "unsafe" applied to a dam because of an inadequate spillway does not indicate the same degree of emergency as that term would if applied because of structural deficiency. It does indicate, however, that a severe storm may cause overtopping and possible failure of the dam, with significant damage and potential loss of life downstream.

It is recommended that within twelve months from the date of this report the owner of the dam engage the services of a professional or consulting engineer to determine by more sophisticated methods and procedures the magnitude of the spillway deficiency. Based on this determination, appropriate remedial mitigating measures should be designed and completed within 24 months of this date of notification. In the interim a detailed emergency operation plan and warning system should be promptly developed. During periods of unusually heavy precipitation, round-the-clock surveillance should be provided.

NEDED-E
Honorable Edward J. King

I have approved the report and support the findings and recommendations described in Section 7, with qualifications as noted above. I request that you keep me informed of the actions taken to implement these recommendations since this follow-up is an important part of the non-Federal Dam Inspection Program.

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. This report has also been furnished to the owner of the project, Lost Lake Water Committee.

Copies of this report will be made available to the public, upon request to this office, under the Freedom of Information Act, thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Quality Engineering for the cooperation extended in carrying out this program.

Sincerely,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

NATIONAL DAM INSPECTION PROGRAM
PHASE I INVESTIGATION REPORT
BRIEF ASSESSMENT

Indentification No.: MA 00808

Name of Dam: Lost Lake Dam

Town: Groton

County and State: Middlesex County, Massachusetts

Stream: Cow Pond Brook

Date of Inspection: November 5, 1979

The dam is about 80 feet long and 10 feet high. It was constructed of earth fill with a concrete wall at the upstream face and a small concrete spillway and outlet channel. The dam is owned and operated by the Lost Lake Water Committee. It was constructed in the early 1900's.

There was no indepth engineering data available for review. Therefore, the adequacy of the dam was primarily evaluated by visual inspection, past performance history and sound engineering judgement. The visual inspection indicated the dam to be in fair condition.

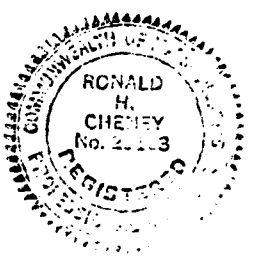
The dam has a size classification of intermediate and a hazard potential classification of high. Based upon Corps Guidelines, the PMF test flood inflow would be 3,500 cfs, from the 4.11 square mile drainage area. The test flood discharge is 2,300 cfs and 2,020 cfs, with and without stoplogs, respectively. The corresponding surcharge elevations are 219.5 and 219.1. The top of dam, elevation 216, is overtopped in both cases. The spillway has a capacity of about 75 to 200 cfs with and without stoplogs,

respectively. This equals 3 and 10 percent of the test flood outflow.

The dam is in fair condition. It is recommended that the Owner engage a qualified registered professional engineer to perform a detailed hydraulic/hydrologic investigation concerning increasing spillway capacity, providing draw down facilities, and the ability of the dam to withstand overtopping. Also a qualified registered professional engineer should supervise the removal of the large trees growing on the dam and the back-filling of the subsequent holes.

The Owner should institute remedial measures which include: operating the spillway without stoplogs to provide the maximum available discharge and storage capacity; placing slope protection at the end of the spillway outlet; development of a formal warning system for the downstream impact area; and inspecting the dam once every year by a qualified registered professional engineer.

The recommendations and remedial measures should be implemented by the Owner within one year after receipt of this Phase I Investigation Report.



Ronald H. Cheney, P.E.
Vice President

Hayden, Harding & Buchanan, Inc.
Boston, Massachusetts

This Phase I Inspection Report on Lost Lake Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

ARAMAST MAHTESIAN, MEMBER
Geotechnical Engineering Branch
Engineering Division

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

RICHARD DIBUONO, CHAIRMAN
Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation: however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to

assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The Phase I Investigation does <u>not</u> include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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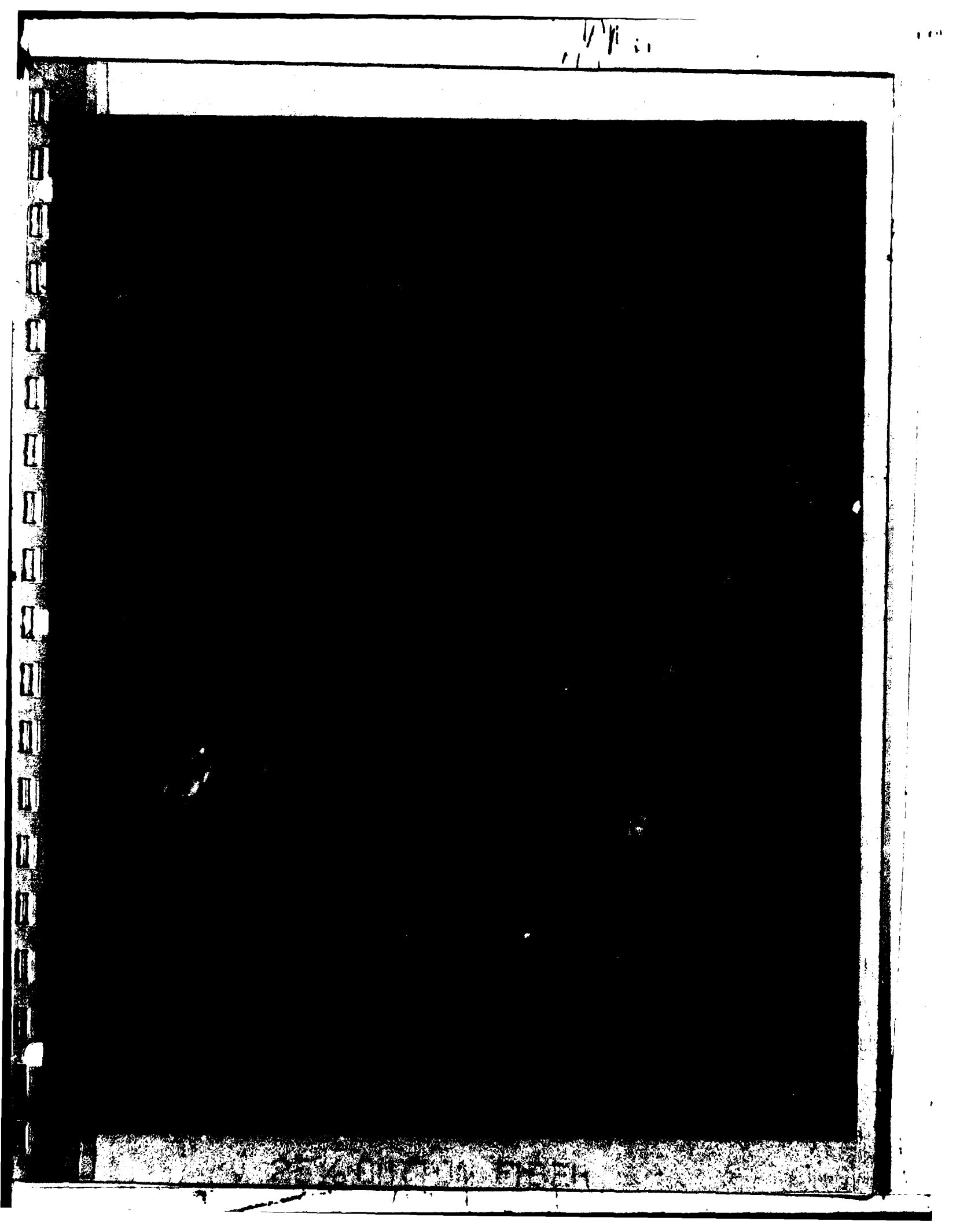


HAYDEN, HARDING & BUCHANAN, INC. CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOST LAKE DAM
LOCATION PLAN

GROTON — MASSACHUSETTS

SCALE: 1: 24000

DATE: DECEMBER 1978

PHASE I
NATIONAL DAM INSPECTION PROGRAM

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Hayden, Harding & Buchanan, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed was issued Hayden, Harding & Buchanan, Inc. under a letter of 24 October 1979 from William E. Hodgson Jr., Colonel, Corps of Engineers. Contract No. DACW 33-80-C-0006 has been assigned by the Corps of Engineers for this work.

b. Purpose

(1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) Encourage and assist the States to initiate quickly effective dam safety programs for non-Federal dams.

(3) To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location

Lost Lake Dam is located in the Town of Groton, in Middlesex County, Massachusetts. The dam impounds the waters of Lost Lake and is located within the northeast portion of the lake. Lost Lake Dam is shown on the Ayer U.S.G.S. Massachusetts Quadrangle with the approximate coordinates of North 42°36'00", West 71°31'07".

b. Description of Dam and Appurtenances

Lost Lake Dam is a 10± foot high by 80± foot long concrete and earth embankment structure containing a central concrete spillway. The spillway has a 15 foot wide concrete, downstream channel. Without stoplogs the spillway has a 7 foot long by 4 foot high opening, however stoplogs can be added to the crest. The spillway is flanked on the right by a 40± foot long earth embankment having a vertical 3 foot thick stepped concrete wall on the upstream side. The left side of the spillway is flanked by a 33½± foot earth embankment with a similar upstream wall (see photographs in Appendix C). The downstream slope is sparsely vegetated and is sloped at approximately 1½ Hor.:1 Vert. There are 6 foot long nearly vertical concrete retaining walls at the end of the downstream spillway channel. The spillway stoplogs are manually installed. There are no other operational facilities contained within the dam. Located approximately 300 feet downstream of the dam, there is an 18± foot high roadway embankment containing a 4½ foot diameter metal culvert.

c. Size Classification

The dam is classified as intermediate based on its storage capacity of 1,809 acre feet.

d. Hazard Classification

The dam has a high hazard potential. It is estimated that approximately 4 homes would receive flood-water damage if the dam were to fail. Flood stage could reach a depth of 5 feet. The maximum failure discharge would be 1,700 cfs.

e. Ownership

The dam is owned by shareholders in the Lost Lake Water Committee. Groton Woods Baptist Camp, of Groton, Massachusetts owns approximately 80% of the shares.

f. Operator

The dam is maintained by the Lost Lake Water Committee. Mr. Ronald Campbell of the Groton Woods Baptist Camp is the designated caretaker of the dam. (telephone 617-448-5763)

g. Purpose of Dam

The purpose of this dam is for recreation. The height of stoplogs in the spillway controls the water level.

h. Design and Construction History

There were no records located which indicate the year the structure was built or when subsequent repairs or modifications, if any, were made.

i. Normal Operational Procedures

The caretaker installs stoplogs in the spring and removes them in the fall. The elevation of the lake is

maintained approximately 2 feet higher in the summer than the winter.

1.3 Pertinent Data

a. Drainage Area

The drainage area 4.11 s.m. (2,630 acres) is basically rural with rolling hills and flat swamp areas. The lake is located at the southern end of the Merrimack River Drainage Basin about 3.5 miles from the Town of Ayer. See the drainage area map in Appendix D and photographs in Appendix C. The land around the lake was developed for summer homes, many of which are now used year-round.

The longest drainage path is Martins Pond Brook. It flows 10,000 feet from Martins Pond (elevation 317) to Lost Lake (elevation 212). This brook and the swamps to the northeast of Lost Lake control about 50 percent of the drainage area. All other drainage paths which flow into Lost Lake pass through swamp areas. The large amount of swamp areas will have a significant impact on peak storm runoff discharge.

Development downstream of the lake is limited to several homes within 1,500 feet of the dam. Beyond that, the area is undeveloped swampland.

b. Discharge at Damsite

1. Outlet Works

The dam at Lost Lake has no outlet conduits. The only outlet is the spillway.

2. Maximum Known Flood at Damsite

There are no records of the maximum flood at the dam. The United States Weather Bureau records indicate that about 8 inches

of rainfall occurred near the general location of the dam from August 17 to 20, 1955 and September 17 to 22, 1938.

3. Ungated Spillway Capacity at Top of Dam

The spillway's dimensions are 7± feet long at the top by 4± feet deep. The bottom width, at elevation 212, is 6± feet. Without stoplogs, its maximum capacity is 200± cfs, at elevation 216.

4. Gated Spillway Capacity at Normal Pool Elevation

With 2± feet of stoplogs in place, normal pool elevation of 214, the spillway maximum capacity would be 75± cfs, when the water level is at elevation 216, top of dam.

5. Total Project Discharge at Test Flood Elevation

The PMF test flood surcharge elevation is 219.5. The total project discharge is 2,300 cfs, with 2 feet of stoplogs in place. Without stoplogs, the discharge is 2,020 cfs and the test flood elevation is 219.1.

c. Elevation (ft. above NGVD elevations are approximate)

(1) Streambed at toe of dam ---------- 206

(2) Bottom of cutoff ---------- unknown

(3) Maximum tailwater ---------- 216.5

(4) Recreation pool ---------- 214

(5) Full flood control pool ---------- N/A

(6) Spillway crest ---------- 212

(7) Design surcharge (Original Design) ------ unknown

(8) Top of dam ---------- 216

(9) Test flood surcharge - 219.5 with 2' of stoplogs
219.1 without stoplogs

d. Reservoir (Length in feet)

(1) Normal pool ---------- 5000

(2) Flood control pool ---------- N/A

(3) Spillway crest pool ---------- 5000

(4) Top of dam ---------- 5000

(5) Test flood pool ---------- 5000+

e. Storage (acre-feet)

(1) Spillway crest pool --------- 945 (elevation 212)

(2) Normal pool ---------- 1350 (elevation 214±)

(3) Top of dam ---------- 1809 (elevation 216)

(4) Test flood pool ---------- 2940 (elevation 219.5)

(5) Flood control pool ---------- N/A

f. Reservoir Surface (acres)

(1) Spillway crest ---------- 200

(2) Normal pool ---------- 216

(3) Top of dam ---------- 232

(4) Test flood pool ---------- 260

(5) Flood control pool ---------- N/A

g. Dam

(1) Type ------ gravity, concrete, masonry, earth

(2) Length ---------- 80±'

(3) Height ---------- 10±'

(4) Top Width ---------- 12±'

(5) Side Slopes - u.s. vertical, d.s. sloped 1½:1±

(6) Zoning ---------- unknown

(7) Impervious Core ---------- unknown

(8) Cutoff ---------- unknown

(9) Grout curtain ---------- unknown

(10) Other ------ entire composition of embankment is unknown

h. Diversion and Regulating Tunnel ----- none at this project

i. Spillway

(1) Type ---------- irregular shape - concrete

(2) Length of weir ---------- 7±'

(3) Crest elevation -------- 214 with stoplogs
212 without stoplogs

(4) Gates ---------- none

(5) U/S Channel --- none - opens directly to lake

(6) D/S Channel -------- concrete channel through dam then natural stream channel

j. Regulating Outlets

The only regulating outlet is the spillway. It has provisions for up to four feet of stoplogs which would raise the level of the reservoir to the top of dam elevation of 216. Normally 2 feet of stoplogs are used.

SECTION 2

ENGINEERING DATA

2.1 Design Data

No information was located indicating when or by whom the dam was designed. No indepth design calculations were located.

2.2 Construction Data

No construction data was located for this dam.

2.3 Operation Data

No operational manual exists for this dam.

2.4 Evaluation of Data

a. Availability

No engineering data was located regarding Lost Lake Dam. A State Inspection Report for 1974 was made available at the State Department of Environmental Quality Engineering, Division of Waterways, Boston Office.

b. Adequacy

The lack of indepth engineering data does not allow for a definitive review. Therefore, the adequacy of this dam, structurally and hydraulically, can not be assessed from the standpoint of review of design calculations, but must be based primarily on the visual inspection, past performance history, and sound engineering judgement.

c. Validity

The visual inspection of this facility showed no reason to question the validity of the information supplied on the State Inspection Reports.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General

The dam consists of an earth embankment with a concrete upstream face. A spillway is located at the approximate center of the dam.

b. Dam

The upstream face of the dam consists of a vertical concrete wall, photograph 1. The concrete is generally in good condition. There is no riprap at the junction of the wall and the left abutment.

The crest of the dam is covered with grass, photograph 2. The crest of the dam to the right of the spillway appears to have settled about 3 in. below the top of the concrete wall on the upstream face of the dam.

The downstream face of the dam is partially covered with grass. Large trees up to about 16 in. in diameter are growing on the downstream face, photograph 3. Erosion was observed at the junction of the downstream face and the left abutment and at the junction with the right abutment, photograph 4.

The dam has no draw down facilities. The spillway is normally operated with 24 inches of flashboards.

c. Appurtenant Structure

The spillway which is located in the center of the dam is shown in photograph 5. Water was flowing over the spillway

at the time of the inspection. The concrete of the training walls has deteriorated at the downstream end near the base of the walls, as shown in photograph 6. Wing walls on the downstream slope of the dam have separated slightly from the spillway training walls, as shown in photograph 6.

d. Reservoir Area

Erosion was observed along the lake bank under the slab for a house located about 100 ft. upstream of the dam, photograph 7.

e. Downstream Channel

The downstream channel is a natural streambed, photograph 8. There is a roadway embankment located across the downstream channel about 300 ft. downstream of the dam, which has a 4.5 ft. diameter metal culvert located in the embankment to pass stream flows.

3.2 Evaluation

Visual inspection indicates that the dam is in generally fair condition. Trees growing on the downstream face of the dam should be removed to prevent their roots from causing deterioration of the embankment.

A draw down facility should be provided to allow the lake level to be lowered.

SECTION 4

OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

a. General

The purpose of the dam is for recreation. Stoplogs are used at the spillway to control the water surface elevation. Typically, 24 inches of stoplogs are used, depending upon winter or summer use. The spillway has provisions for 48 inches of stoplogs.

b. Description of Warning Systems

There are no warning systems at this dam.

4.2 Maintenance Procedures

a. General

General maintenance is the responsibility of the Lost Lake Water Committee. Typically, maintenance consists of regulating the height of stoplogs at the spillway for winter and summer use. The level is normally higher during the summer.

b. Operating Facilities

There is no formal operational procedure for this facility. The dam is used for recreation.

4.3 Evaluation

There is no formal maintenance procedure at this dam. Vegetation and trees on the dam should be removed. New vegetation growth should be removed every year. The dam should be inspected every year by a qualified registered professional engineer who can identify conditions of concern which if left unchecked could jeopardize the safety of the dam.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General

Lost Lake is located in the Town of Groton, Massachusetts, just north of the Town of Ayer. The drainage area 4.11 s.m. (2,630 acres) is comprised of gently rolling hills and flat swampy areas which may significantly affect the rate of storm water runoff. The area is rural and many of the houses around the lake were summer cottages. The lake, comprised of Lost Lake and Knops Pond, has a surface area of 232 acres. Water discharges from the spillway, located at the north end of the lake. The outlet brook, Cow Pond Brook, becomes Salmon Brook, which flows northerly to the Merrimac River, at Nashua, New Hampshire, 13 miles away. The outlet brook channel has a flat slope and the normal channel section is about 15 feet wide with variable bank heights immediately downstream of the dam. See photographs in Appendix C. See the drainage area map and drawings in Appendixes B and D and Section 1.3.

5.2 Design Data

Hydraulic/hydrologic design data for this project could not be located.

5.3 Experience Data

Records of past flood experience and possible overtopping of the dam could not be found. The United States Weather Bureau records indicate that from August 17 to 20, 1955 about 8 inches of rainfall occurred near the general location of Lost Lake.

5.4 Test Flood Analysis

The dam has an intermediate size classification and a high hazard potential. Based upon Corps Guidelines, the test flood would be in the PMF. The PMF inflow based upon the 4.11 s.m., flat drainage area is 3,500.

Normally, 24 inches of stoplogs are used in the spillway. Recreational pond level is at elevation 214. See photographs 5 and 1. This leaves a spillway capacity of about 75 cfs before the top of dam, elevation 216±, would be overtopped. Without stoplogs, the spillway capacity would be about 200 cfs. See Appendix D for hydraulic calculations.

With the initial water elevation at 214±, the inflow of 3,500 cfs would surcharge the lake to elevation 219.5±. The resulting outflow would be 2,300 cfs. Without stoplogs, initial elevation 212, the discharge is 2,020 cfs and the surcharge elevation is 219.1±. The spillway passes 3 percent of the test flood outflow with stoplogs and 10 percent without stoplogs. The remaining flow overtops the dam by 3.5 and 3.1 feet, respectively. The lake will be providing stage storage for 6.5 to 8.0 inches of runoff.

About 300 feet downstream, an earthen road embankment crosses the outlet brook. See photographs 10, 11 and 13. A 4.5 foot diameter metal culvert passes through the embankment. The culvert and embankment (top elevation of 213±) could cause a back water condition at the dam. The structural integrity of the earth roadway embankment may also be seriously reduced by an increased water level on the upstream face.

5.5 Dam Failure Analysis

Failure analysis was performed assuming an initial water level

at elevation 216, top of dam. See photograph 5. The dam has a hydraulic height of 10 feet and a maximum storage capacity of 1,809 acre-feet (a-f). Just prior to failure, the spillway would be discharging water at 75± cfs. This flow would not cause any significant downstream flooding, prior to dam failure, or damage houses along the outlet brook.

Assuming that 40% of the 80 foot long concrete and earth embankment dam failed, (see photographs 5 and 2) the peak failure outflow would be 1,700± cfs. The peak failure outflow was determined using Corps "rule of thumb" guidance. The failure discharge would flow 300 feet downstream to the 18 foot high earthen road embankment. The 4.5 foot diameter road culvert will not carry the failure outflow. The road embankment could be overtopped. The channel downstream of the embankment would carry the failure flow at a depth of 5± feet. At least 4 homes (see photograph 14) would be damaged by floodwater. Damage would vary from floodwater 1 to 5± feet deep, depending upon the elevation of each structure.

Floodwater due to dam failure could also cause the failure of the road embankment. This would depend upon the structural integrity of the embankment. Visual inspection of this roadway embankment indicates that the embankment could not be counted on to impound the released water from the upstream dam failure. It is likely that a secondary failure of this roadway embankment

would occur. The failure of this roadway could serve to increase the flooding to the 4 homes immediately downstream.

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations

The visual inspection did not disclose any immediate stability problems. However, the roots of the trees growing on the downstream face of the dam could lead to deterioration of the dam due to blow downs during storms.

6.2 Design and Construction Data

There are no available design and construction data.

6.3 Post Construction Changes

There are no known post construction changes of the dam.

6.4 Seismic Stability

The dam is located in Seismic Zone 2 and in accordance with the recommended Phase I guidelines does not warrant seismic analysis.

SECTION 7

ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition

On the basis of the visual inspection, the dam is judged to be in generally fair condition. The future safety of the dam can be endangered by the blowing down of trees growing on the downstream face of the dam.

b. Adequacy of Information

The information available was very limited, and this assessment of the condition of the dam is based principally on the visual inspection.

c. Urgency

The recommendations and remedial measures presented in Section 7.2 and 7.3 should be implemented within one year after receipt of the Phase I Inspection Report by the Owner.

7.2 Recommendations

a. The Owner should engage a qualified registered professional engineer to perform a detailed hydraulic/hydrologic investigation and make recommendations concerning increasing the spillway's capacity, determining the size and location of a draw down facility, and the ability of the dam to withstand overtopping.

b. Trees and brushes growing on the dam should be removed and later growth cut every year. The removal of these large trees and roots, and the backfilling of the created holes should be under the direction of a qualified registered professional engineeer.

7.3 Remedial Measures

a. Operation & Maitenance Procedures

1. The dam should be inspected every year by a qualified registered professional engineer.

2. The spillway should be operated without stoplogs to provide the maximum available discharge and storage capacity until recommendation 7.2.a. has been implemented.

3. Slope protection should be placed at the end of the spillway outlet channel to prevent erosion of the downstream toe of dam and undermining of the concrete outlet.

4. The Owner should develop a formal warning system for downstream areas in case of an emergency and provide around the clock monitoring of the dam during periods of heavy rainfall.

7.4 Alternative

There are no practical alternatives for this dam.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT Lost Lake Dam

DATE November 5, 1979

TIME 0930

WEATHER Sunny, Cool

W.S. ELEV. 214 U.S. -- DN.S.

PARTY:

1. Ron Cheney - HHB
2. Dave Vine - HHB
3. Dan LaGatta - GEI
4. Steve Whiteside - GEI
5. Mike Angieri - HHB
6.
7.
8.
9.
10.

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Embankment Dam	D. LaGatta, S. Whiteside	
2.	Spillway	R. Cheney, D. Vine, M. Angieri	
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECKLIST

PROJECT Lost Lake Dam DATE 11/5/79

PROJECT FEATURE Dam Embankment NAME D. LaGatta

DISCIPLINE Geotechnical Engineer NAME S. Whiteside

Structural Engineer R. Cheney
M. Angieri

AREA EVALUATED	CONDITION
DAM EMBANKMENT	
Crest Elevation	216± (from USGS map)
Current Pool Elevation	212±
Maximum Impoundment to Date	Unknown
Surface Cracks	None observed.
Pavement Condition	No pavement.
Movement or Settlement of Crest	Soil portion of crest to right of spillway appeared to have settled about 3-in below top of concrete section of crest.
Lateral Movement	None observed.
Vertical Alignment	Good.
Horizontal Alignment	Good.
Condition at Abutment and at Concrete Structures	No riprap protection at junction of dam and abutments.
Indications of Movement of Structural Items on Slopes	None observed.
Trespassing on Slopes	Pedestrian paths on crest and downstream slope.
Sloughing or Erosion of Slopes or Abutments	Erosion evident on downstream slope.
Rock Slope Protection - Riprap Failures	No riprap observed.
Unusual Movement or Cracking at or Near Toe	None observed.
Unusual Embankment or Downstream Seepage	Wet spot about 30 ft downstream of concrete wall to right of spillway channel. Probably accumulated surface runoff.
Piping or Boils	None observed.
Foundation Drainage Features	None observed.
Toe Drains	None observed.
Instrumentation System	None observed.
Vegetation	Large trees (up to 16-in dia.) on downstream slope.

PERIODIC INSPECTION CHECKLIST

PROJECT Lost Lake Dam DATE 11/5/79

PROJECT FEATURE Outlet Works NAME D. LaGatta

DISCIPLINE Geotechnical Engineer NAME S. Whiteside

Structural Engineer R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	None observed.
a. Approach Channel	
Slope Conditions	
Bottom Conditions	
Rock Slides or Falls	
Log Boom	
Debris	
Condition of Concrete Lining	
Drains or Weep Holes	
b. Intake Structure	
Condition of Concrete	
Stop Logs and Slots	

PERIODIC INSPECTION CHECKLIST

PROJECT Lost Lake Dam DATE 11/5/79

PROJECT FEATURE Outlet Works NAME D. LaGatta

DISCIPLINE Geotechnical Engineer NAME S. Whiteside

Structural Engineer R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	None at this project
a. Concrete and Structural	
General Condition	
Condition of Joints	
Spalling	
Visible Reinforcing	
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	
Joint Alignment	
Unusual Seepage or Leaks in Gate Chamber	
Cracks	
Rusting or Corrosion of Steel	
b. Mechanical and Electrical	
Air Vents	
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	
Service Gates	
Emergency Gates	
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System	

PERIODIC INSPECTION CHECKLIST

PROJECT Lost Lake Dam DATE 11/5/79

PROJECT FEATURE Outlet Works NAME D. LaGatta

DISCIPLINE Geotechnical Engineer NAME S. Whiteside

Structural Engineer R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	None at this project.
General Condition of Concrete	
Rust or Staining on Concrete	
Spalling	
Erosion or Cavitation	
Cracking	
Alignment of Monoliths	
Alignment of Joints	
Numbering of Monoliths	

PERIODIC INSPECTION CHECKLIST

PROJECT Lost Lake Dam DATE 11/5/79

PROJECT FEATURE Outlet Structure NAME D. LaGatta

DISCIPLINE Geotechnical Engineer NAME S. Whiteside

Structural Engineer R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	None observed.
General Condition of Concrete	
Rust or Staining	
Spalling	
Erosion or Cavitation	
Visible Reinforcing	
Any Seepage or Efflorescence	
Condition at Joints	
Drain holes	
Channel	
Loose Rock or Trees Overhanging Channel	
Condition of Discharge Channel	

PERIODIC INSPECTION CHECKLIST

PROJECT Lost Lake Dam DATE 11/5/79

PROJECT FEATURE Spillway Weir & Training Walls NAME D. LaGatta

DISCIPLINE Geotechnical Engineer NAME S. Whiteside

Structural Engineer R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	No approach channel
General Condition	
Loose Rock Overhanging Channel	
Trees Overhanging Channel	
Floor of Approach Channel	
b. Weir and Training Walls	
General Condition of Concrete	Fair to Good
Rust or Staining	Some evidence
Spalling	Some at joints
Any Visible Reinforcing	None found
Any Seepage or Efflorescence	Efflorescence at some joints, no seepage found
Drain Holes	None observed.
c. Discharge Channel	
General Condition	Good.
Loose Rock Overhanging Channel	None observed.
Trees Overhanging Channel	Large trees overhanging channel.
Floor of Channel	Natural streambed with large boulders and cobbles.
Other Obstructions	Roadway embankment located across downstream channel about 300 ft downstream of dam.

PERIODIC INSPECTION CHECKLIST

PROJECT Lost Lake Dam DATE 11/5/79

PROJECT FEATURE Service Bridge NAME D. LaGatta

DISCIPLINE Geotechnical Engineer NAME S. Whiteside

Structural Engineer R. Cheney, M. Angieri

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	None at this project
a. Super Structure	
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Underside of Deck	
Secondary Bracing	
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	
b. Abutment & Piers	
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat & Backwall	

APPENDIX B

ENGINEERING DATA

LIST OF ENGINEERING DATA

A State Inspection Report for 1974 was made available at the State Department of Environment Quality Engineering, Division of Waterways Office, 100 Nashua Street, Boston, Massachusetts 02114.

No additional Engineering Data was located.

OD FILE

INSPECTION REPORT - DAMS AND RESERVOIRS

(1.) Location: ~~City~~/Town GROTON DAM No. 4-9-115-4

Name of Dam LOST LAKE DAM Inspected by A.Z. PIZAN & F.H. PARE

Date of Inspection 4-17-'74

(2.) Owners: Per: Ans. ✓ Prev. Inspection

Reg. of Deeds Pers. Contact

1. AMERICAN BAPTISTS, GROTON WOODS BAPTIST CAMP, 448-5763
Name St. & No. ~~City~~/Town State Tel.No.
GROTON, MASS. - 01450

2. Name St. & No. City/Town State Tel.No.

3. Name St. & No. City/Town State Tel.No.

(3.) Caretaker: (if any) e.g. superintendent, plant manager, appointed by absentee owner, appointed by multi owners.

RONALD CAMPBELL, GROTON WOODS BAPTIST CAMP, 448-5763
Name St. & No. ~~City~~/Town State Tel.No.
GROTON, MASS. - 01450

(4.) No. of Pictures taken NONE

(5.) Degree of Hazard: (if dam should fail completely)*

1. Minor ✓ 2. Moderate

3. Severe 4. Disastrous

*This rating may change as land use changes (future development)

(6.) Outlet Control: Automatic Manual ✓

Operative ✓ Yes: no.

Comments:

(7.) Upstream face of Dam: Condition:

1. Good ✓ 2. Minor Repairs

3. Major Repairs 4. Urgent Repairs

Comments:

NO. 4-9-115-4

Upstream Face of Dam: Condition: 1. Good ✓ 2. Minor Repairs____
3. Major Repairs____ 4. Urgent Repr____

Comments:

Emergency Spillway: Condition: 1. Good ✓ 2. Minor Repairs____
3. Major Repairs____ 4. Urgent Rep__

Comments:

Outlet Works: Inspection 1 1. Above ✓ Below____
Top of dam____ Principal spillway ✓
Other____

Evidence of Deterioration Noted:
Debris Lodged on Trashrack on Embankment BRUSH ON EMBANKMENT.
Animal Burrows and Washouts____
Damage to Riprap on Top of Dam____
Seepage at Abutment Contact____
Evidence of Seepage____
Erosion of Fill____
Erosion____
Cracks____
Breach and/or Debris Impending Thereto____
Clogged or Blocked Spillway____
Other____

DAM NO 4-9-116-4

(12) Remarks & Recommendations: (Fully Explain)

DAM IS IN GOOD CONDITION.

(13) Overall Condition:

1. Safe ✓
2. Minor repairs needed _____
3. Conditionally safe - major repairs needed _____
4. Unsafe _____
5. Reservoir impoundment no longer exists (explain)
6. Recommend removal from inspection list _____

DESCRIPTION OF DAM
DISTRICT 4

Submitted by FRANCIS H. PARÉ & ADAM Z. PIZAN Dam No. 4-9-115-4
Date 4-12-74 City/Town GROTON
Name of Dam LOST LAKE DAM

1. Location: Topo Sheet No. 22D
Provide 8½" x 11" in clear copy of topo map with location of Dam clearly indicated.

2. Year built: UNKNOWN Year/s of subsequent repairs UNKNOWN

3. Purpose of Dam: Water Supply ____. Recreational ✓
Irrigation ____. Other ____

4. Drainage Area: 2 SQ. MI. 1280 ACRES.

5. Normal Ponding Area: 120 acres; Ave. Depth 10'
Impoundment: 400 MIL. gals; 1200 acre ft.

6. No. and type of dwellings located adjacent to pond or reservoir ____
i.e. summer homes etc. 50 COTTAGES ADJ. TO POND & HSE. TRAILER

7. Dimensions of Dam: Length 60' Max. Height 5'
Slopes: Upstream Face VERT.
Downstream Face 1:1
Width across top 15'

8. Classifications of Dam by Materials:
Earth ✓. Conc. Masonary ✓. Stone Masonary ____
Timber ✓. Rockfill ____. Other ____

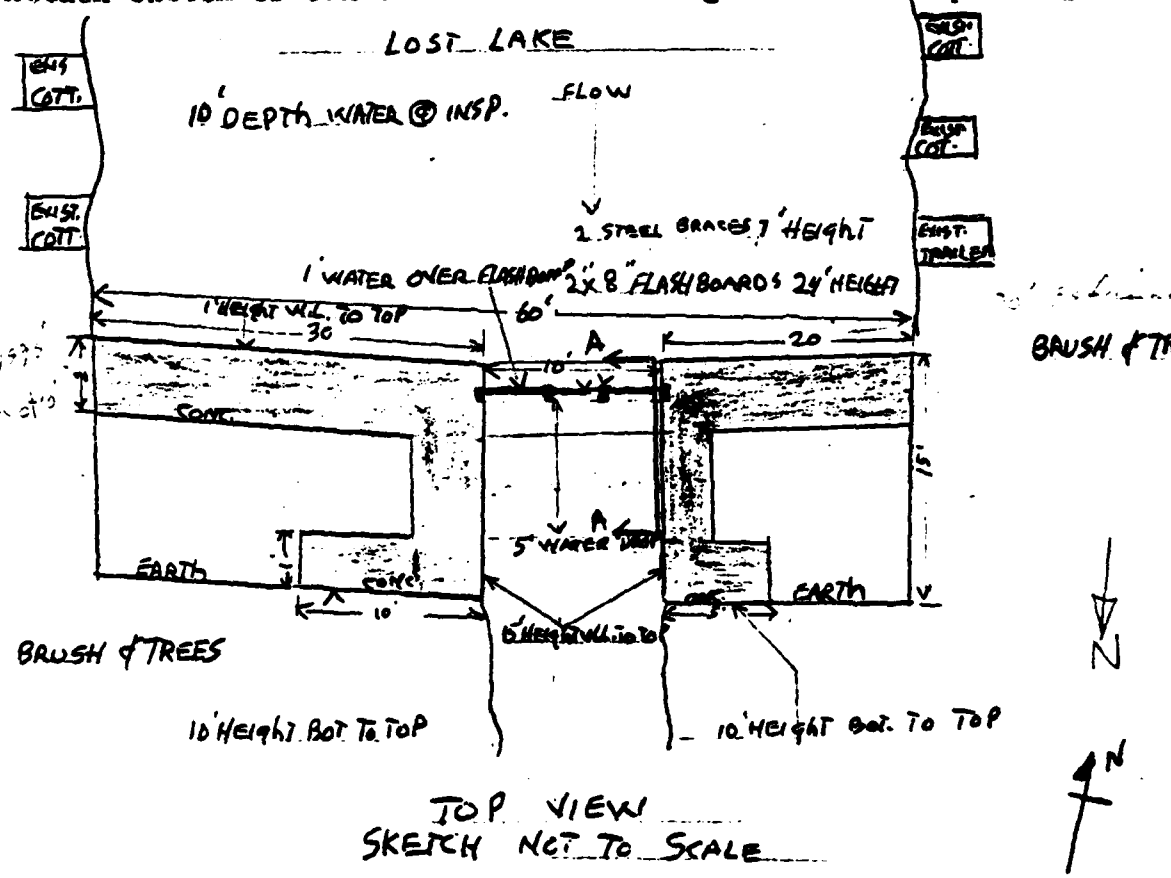
9. A. Description of present land usage downstream of dam: 80 % rural; 20 % urban
B. Is there a storage area or flood plain downstream of dam: which could accommodate the impoundment in the event of a complete dam failure no ✓. yes ____.

DAM NO. 4-9-115-4

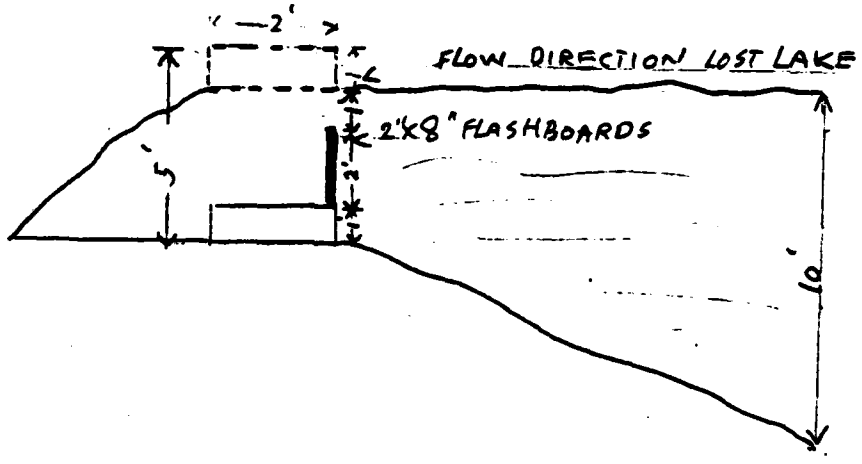
10.
Risk to life and property in event of complete failure.

No. of people	150	
No. of homes	50	
No. of businesses	NONE	
No. of industries	0	Type
No. of utilities	11	Type
Railroads	0	
Other dams	NONE	
Other		

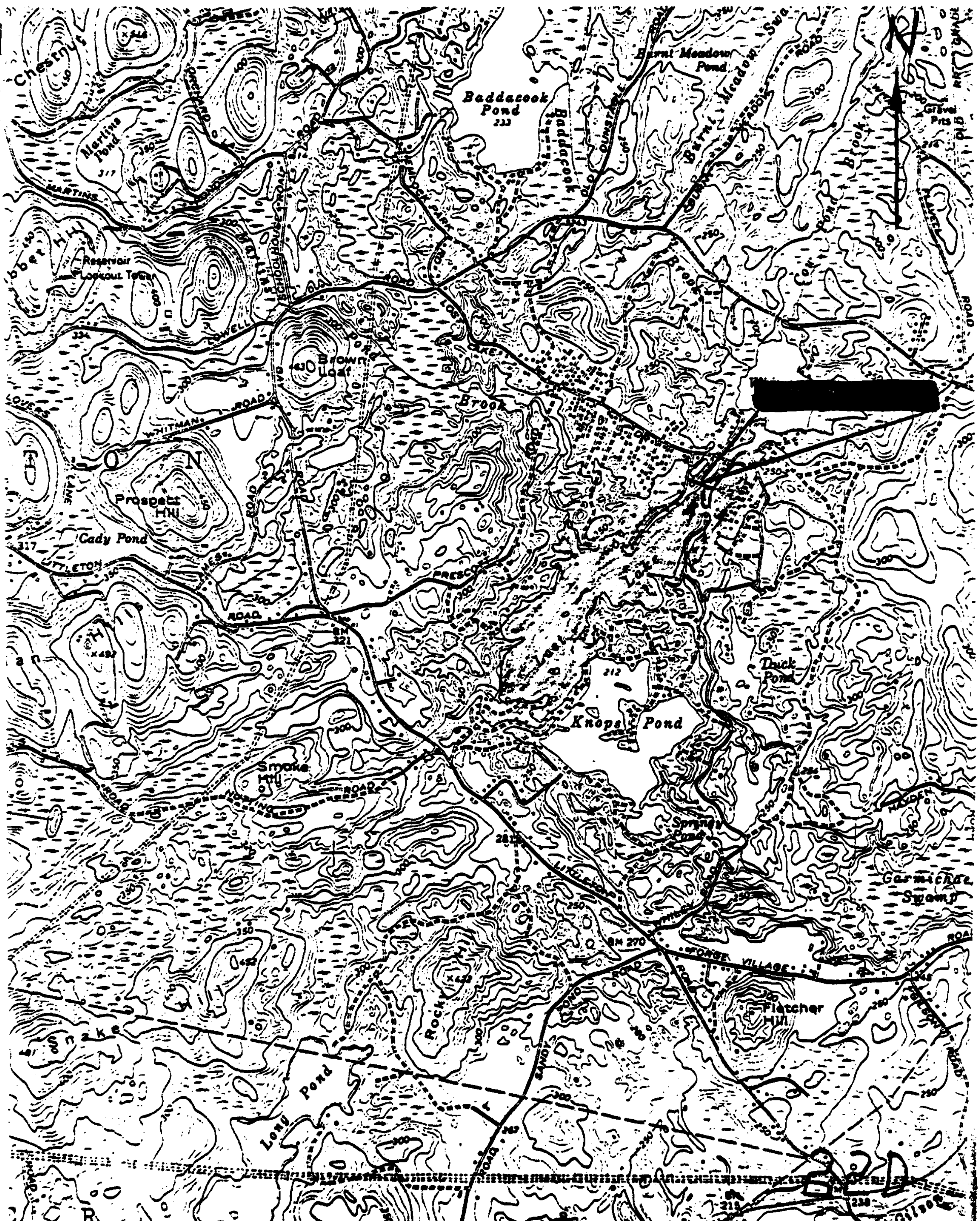
11.
Attach sketch of dam to this form showing section and plan 8½" x 11" Sheet.



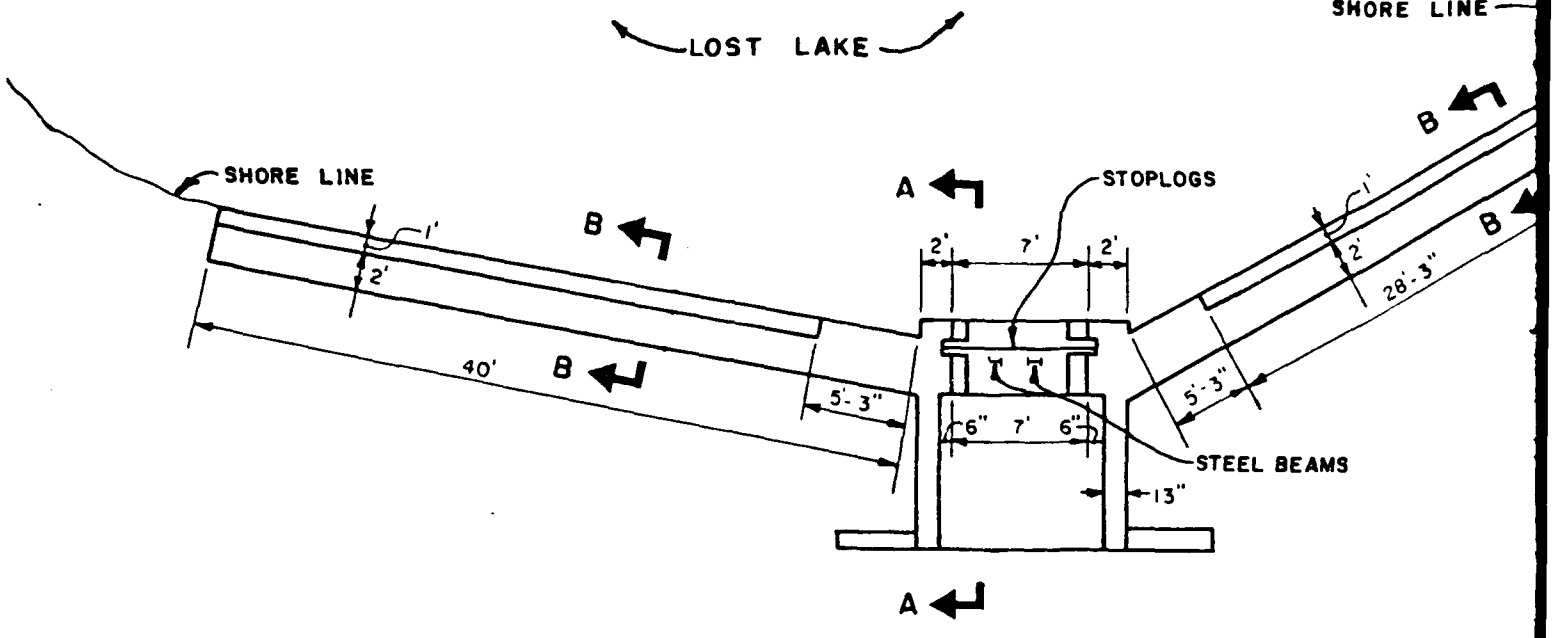
4-9-115-4



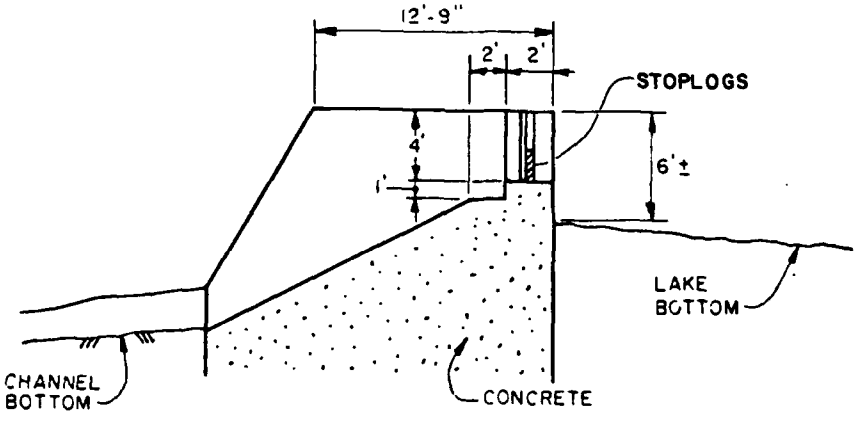
X SECTION
SKETCH NOT TO SCALE



Baddacook Pond
233
Burnt Meadow Pond
Martins Pond
317
Reservoir
Lookout Tower
Brown Loaf
Brook
LOWELL
WHITMAN ROAD
Prospect Hill
Cady Pond
LITTLETON
PRESCOTT
Knops Pond
212
Duck Pond
Smoke Hill
Spring Pond
FORGE VILLAGE
Fletcher Hill
Long Pond
Gravel Pits
BM 321
BM 270
[redacted]

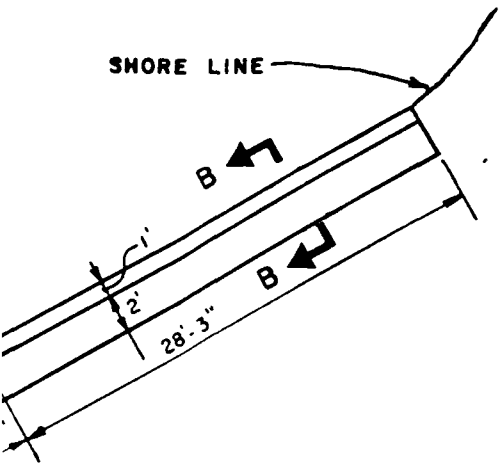


PLAN VIEW

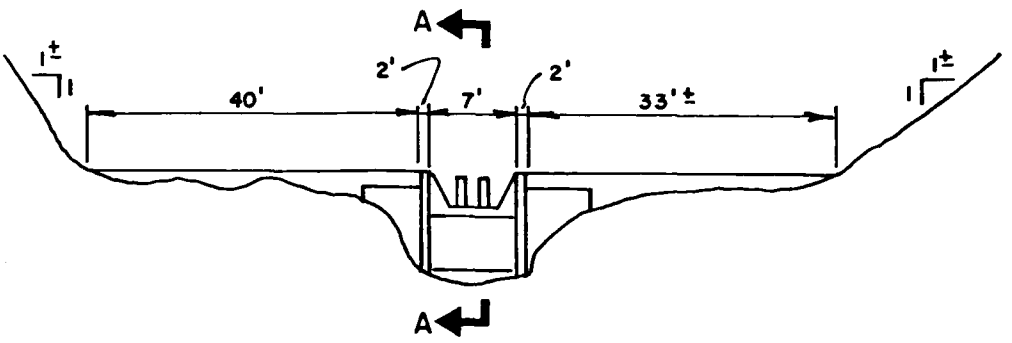


SECTION A-A

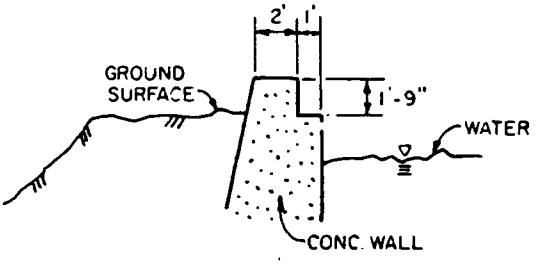
PLAN DEVELOPED FR



EEL BEAMS

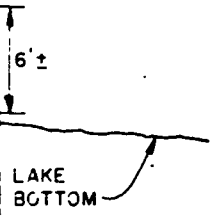


ELEVATION VIEW



SECTION B-B

STOPLOGS



N DEVELOPED FROM ON-SITE INSPECTION

HAYDEN, HARDING & BUCHANAN, INC CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOST LAKE DAM
PLAN & ELEVATION VIEWS & SECTIONS

GROTON MASSACHUSETTS

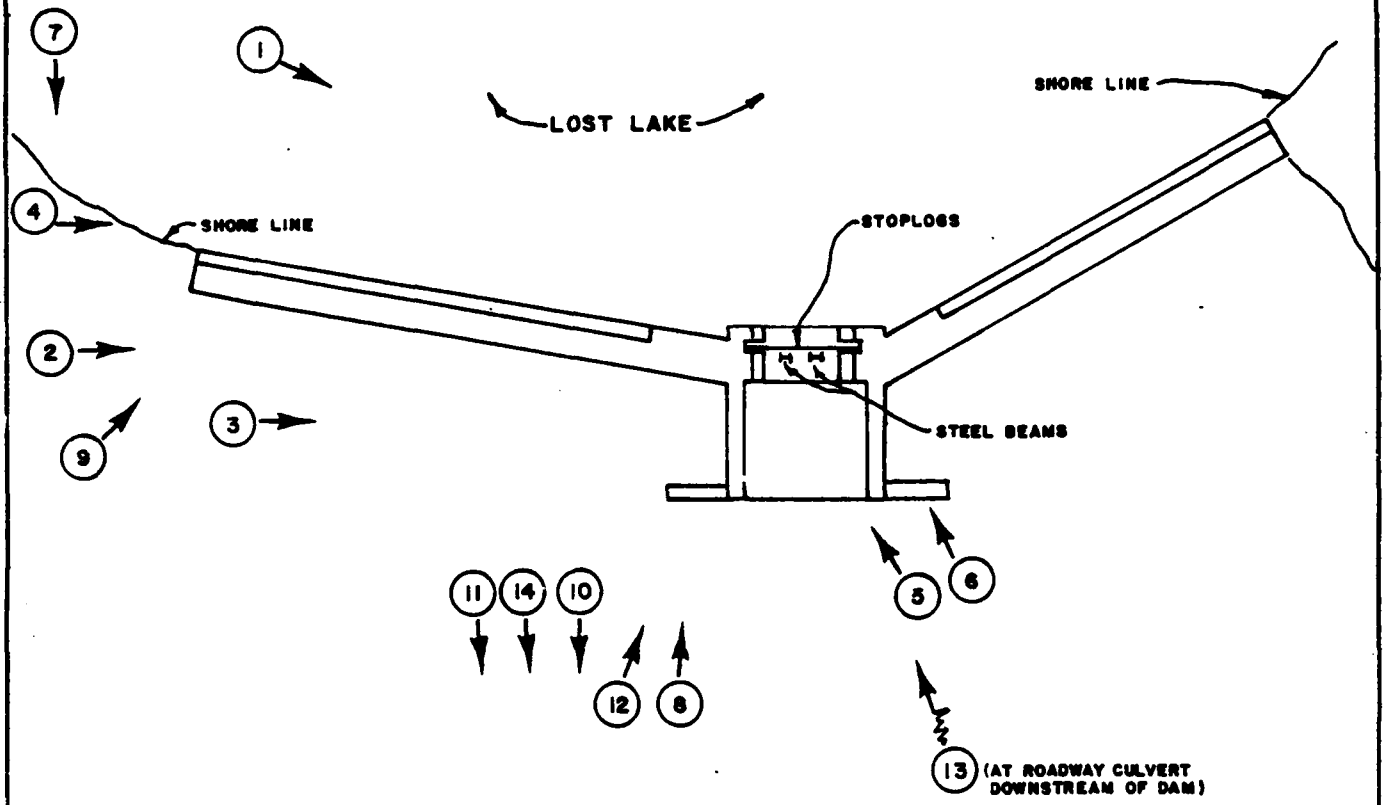
SCALE NOT TO SCALE

DATE DECEMBER 1979

3

APPENDIX C

PHOTOGRAPHS



PLAN VIEW

HAYDEN, HARDING & BUCHANAN, INC. CONSULTING ENGINEERS BOSTON, MASSACHUSETTS	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LOST LAKE DAM
PHOTO LOCATIONS

GROTON MASSACHUSETTS

			SCALE: NOT TO SCALE
			DATE: DECEMBER 1979

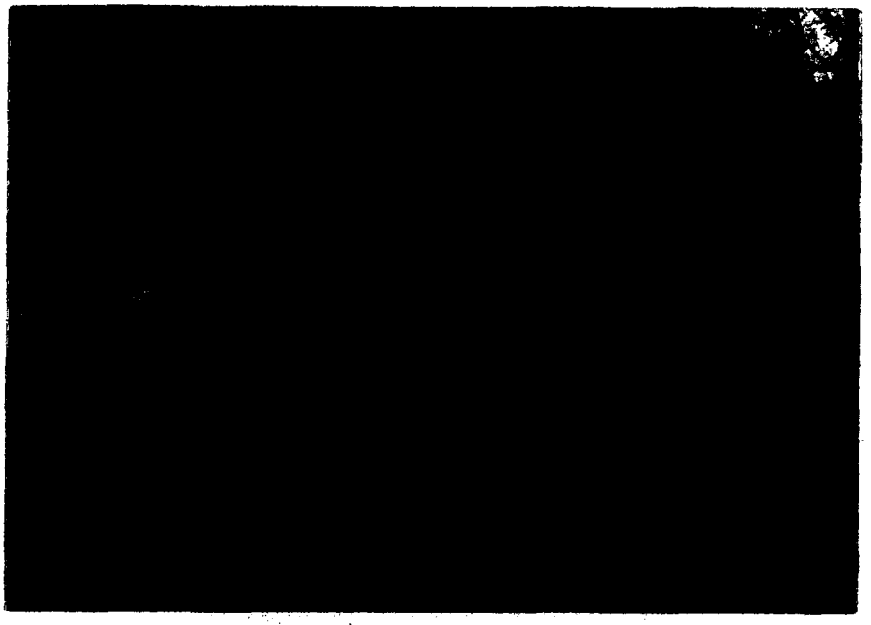


PHOTO NO. 1 - View of upstream face of Dam taken from the right side upstream area.

PHOTO NO. 2 - View looking across the top of Dam taken from the right abutment area.

PHOTO NO. 3 - Crest and downstream face of Dam to right of spillway.

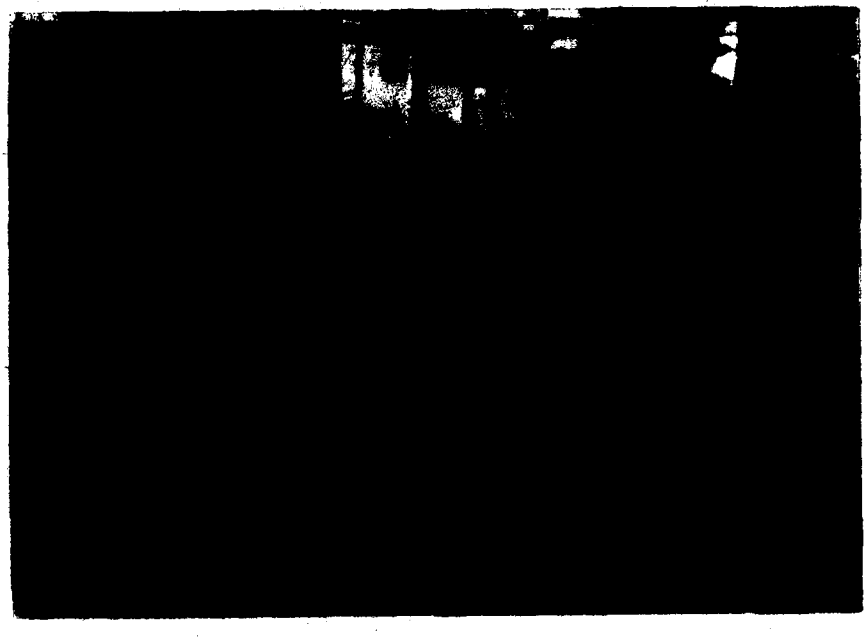


PHOTO NO. 4 - Erosion at junction of right abutment and downstream face of Dam.

PHOTO NO. 5 - View of the downstream face of Dam showing the spillway. Note the concrete outlet channel and retaining walls which lead into the earth embankments.

PHOTO NO. 6 - Wingwall at end of left training wall of spillway.

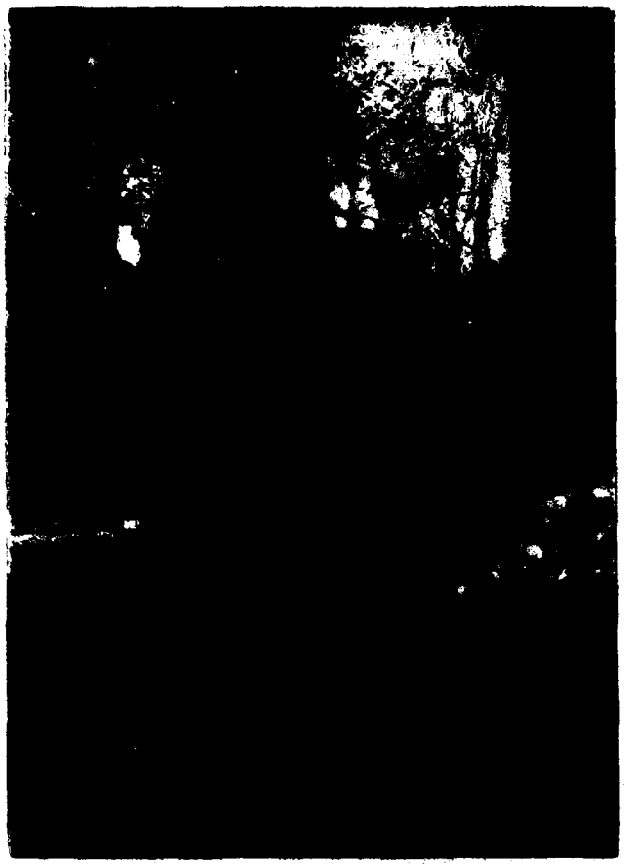


PHOTO NO. 7 - Erosion under slab of house located on reservoir shore. Approximately 100 feet upstream of dam.

PHOTO NO. 8 - Channel between Dam and Roadway embankment as viewed from roadway.

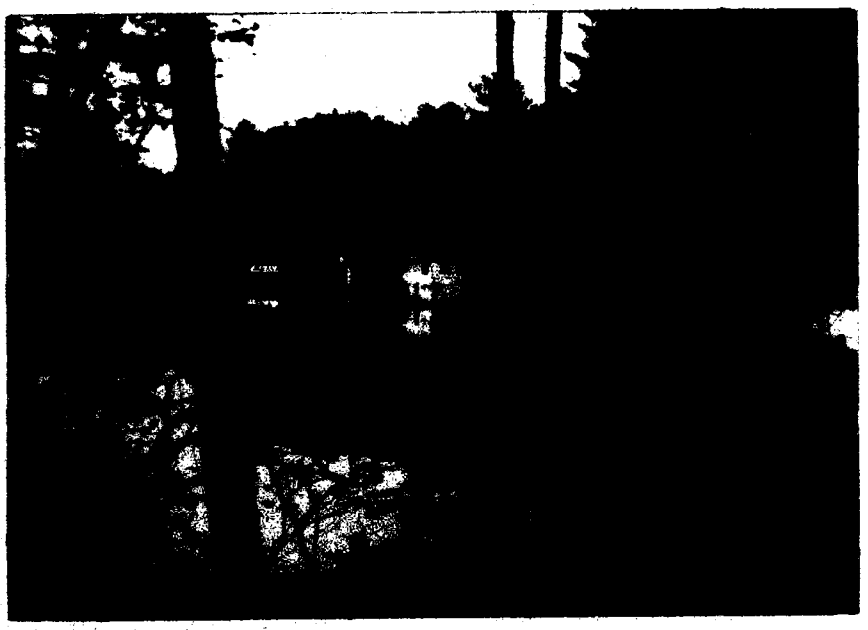


PHOTO NO. 9 - View of upstream development typical around the shores of Lost Lake. Note the top of Dam in lower portion of Photo.

PHOTO NO. 10 - View of immediate downstream channel taken from the toe of Dam. Note the roadway embankment, culvert and ponding area. Failure of the Dam could result in the failure of this embankment.

PHOTO NO. 11 - Close up view of downstream roadway embankment and culvert discussed in Photo No. 10.

PHOTO NO. 12 - View of Dam taken from the downstream roadway embankment.

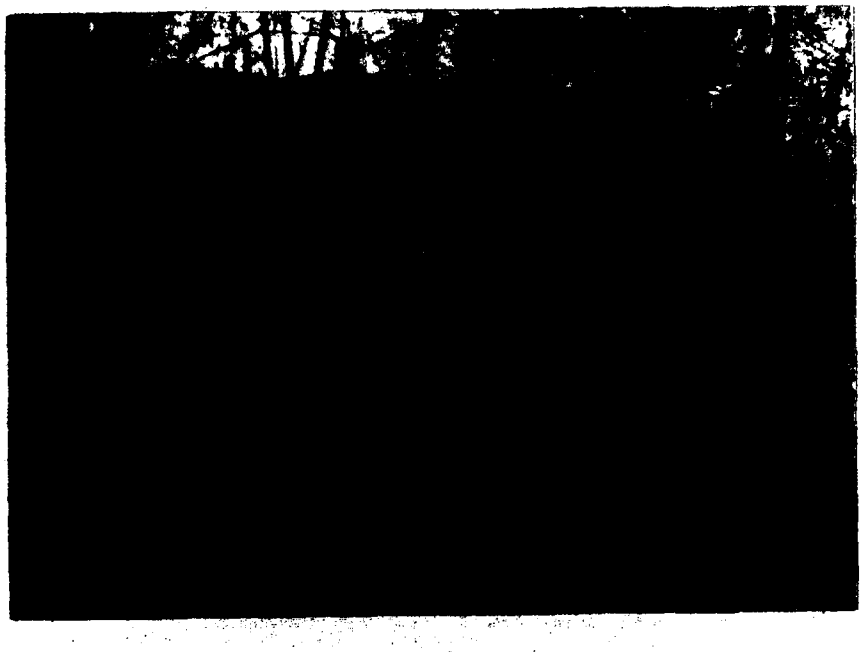


PHOTO NO. 13 - Downstream face of roadway embankment. Note culvert outlet.

PHOTO NO. 14 - Typical location of homes within Dam failure impact area. These homes are just beyond the roadway embankment. First floor levels of several homes are just above the stream bank level. Portions of some homes (note house at left) are supported by wood columns, and are susceptable to major damage even though their first floors are at higher elevations.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

JOB NO. 79.206.12
DATE 10-18-79
BY MA
CH'D BY FDD
rev 1-18-80

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. D2
JOB Dams Loch Lake
SUBJECT
CLIENT COE

Height : 10.ft. (Small)

Storage Capacity : 1,809. a-f (Intermidiate)

Size Class : Intermediate

Hazard Potential : HIGH
(rural area - 4 homes)

Test Flood : Full PMF

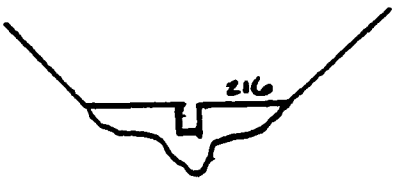
Drainage Area : 4.11 sm (2630 a) flat swampy drainage paths, many restrictions

Test Flood Inflow = $1 \times 850 \frac{cfs}{sm} \times 4.11\ sm = 3500^{\pm}$ cfs.

Spillway Capacity (normally use 2' stoplogs) is 4'x 7'± or 2'x 7'± w/ stoplgs

$Q = 3.7\,(7)(4)^{3/2} \simeq 211^{\pm}$ cfs w/o stoplogs
$3.1\,(7)(2)^{3/2} \simeq 75.^{\pm}$ cfs w/2' " "

$Q = C L H^{3/2}$ $C = 3.39$



Elev	D	C	L	$H^{3/2}$	Q		Q'_{+75}	Q''_{+200}
217	1	3.39	100	1.	339.	cfs	414	540±
218	2	"	101	2.828	968.		1043	1170
219	3	"	102	5.196	1,797.		1872	2000±
220	4	"	103	8.	2,793.		2868	3000
220.5	4.5	"	104	9.5	3366.		3441	3566

JOB NO. 79206 1
DATE 1-18-80
BY MA
CH'D BY FDD

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON — WEST HARTFORD

SHEET NO. D 3
JOB Dams
SUBJECT Lost Lake
CLIENT COE

Test Flood Discharge w/ 2 ft. stoplogs

$Q_{P_1} = 3500$ cfs $h_1 = 220.6$

$Stor_1 = 2940 - 1350 = 1590$ a-f or 7.25" runoff

$Q_{R} = 3500\left(1 - \frac{7.25}{19}\right) = 2165\pm$ $h_2 = 219.3$

$Stor_2 = 2600 - 1350 = 1250$ a-f or 5.7

$Stor_{ave} = \frac{7.25 + 5.7}{2} = 6.5$"

$Q_{P_3} = 3500\left(1 - \frac{6.5}{19}\right) = 2300$ cfs

$H_3 = 219.5$

Dam over-topped by 3.5 ft.

Test Flood Discharge w/o stoplogs

$Q_{P_1} = 3500$ $h_1 = 220.4$

$Str_1 = 2900 - 945 = 1955$ a-f or 8.92"

$Q_{P_2} = 3500\left(1 - \frac{8.92}{19}\right) = 1857$ cfs $h_2 = 218.8$

$Str_2 = 2510 - 945 = 1565$ a-f or 7.14"

$Stor_{ave} = \frac{8.92 + 7.14}{2} = 8.03$".

$Q_{P_3} = 3500\left(1 - \frac{8.03}{19}\right) = 2020$ cfs

$H_3 = 219.1$

Dam overtopped by 3.1 ft.

JOB NO. 79.206.12
DATE 10-19-79
BY MA
CH'D BY FDD

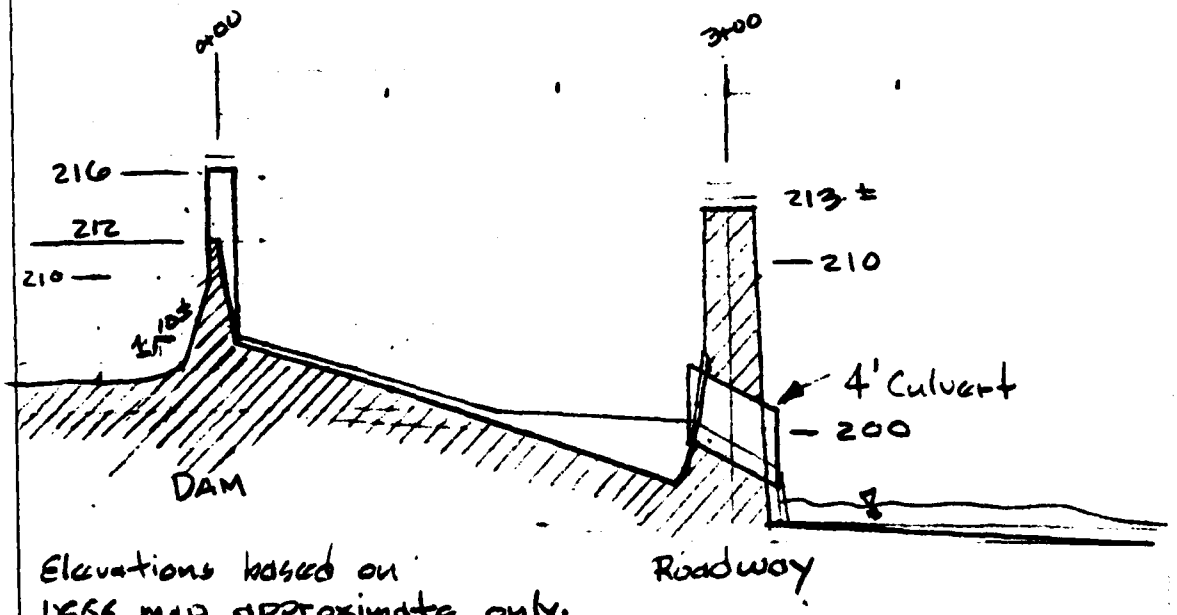
HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS

SHEET NO. D 4
JOB Dams
SUBJECT Lost Lake
CLIENT COE

Drainage Area 2630. acres, 4.11 sq. mi.
wooded / swamp area

Lake Elevation 212 (USGS) = outlet elev.
Lake Area = 200 acres

Stage Elev Ft.	Storage Area a.	Ft.	Stor a-f	Cumm Stor	
220	265	4	994	2803	
216	232	2	448	1809	
214	216	2	416	1361	Normal Level
212	200	6	945	945	
206	115		—	—	



Elevations based on USGS map, approximate only.

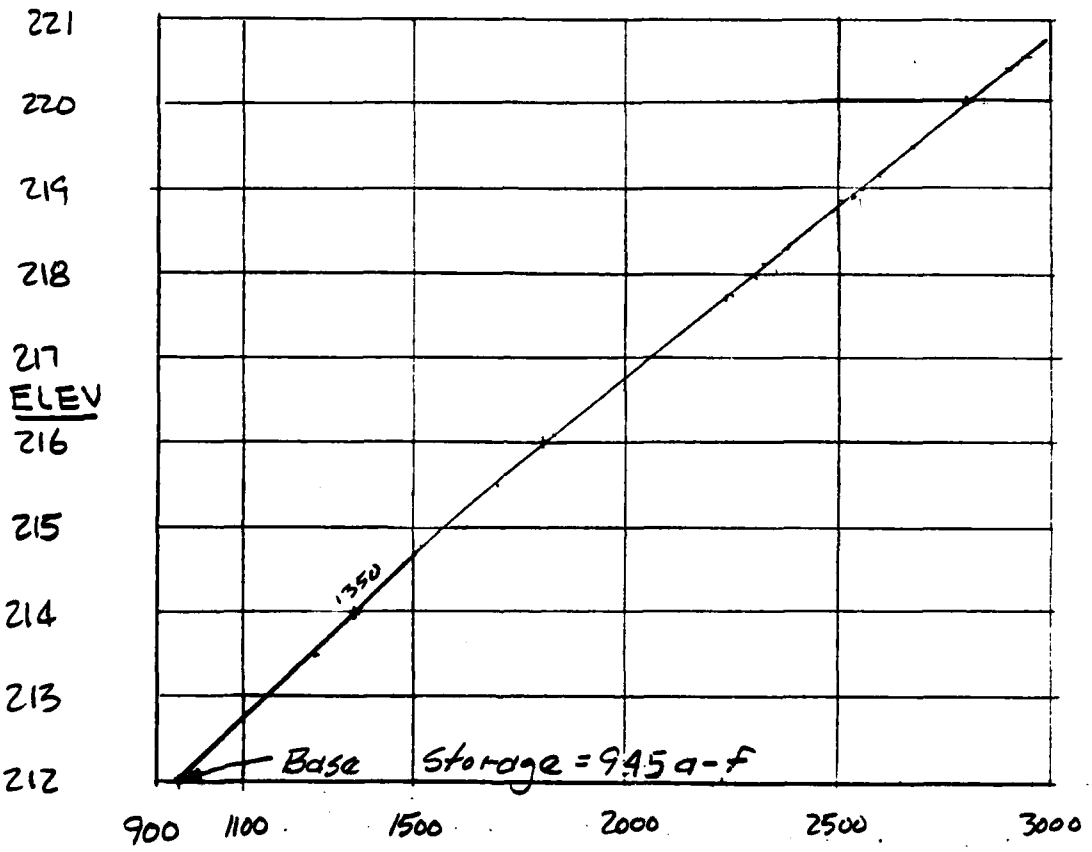
JOB NO. 79.206.1
DATE 11-6-79
BY MA
CH'D BY FDD

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON — WEST HARTFORD

SHEET NO. D 5
JOB Dams
SUBJECT Lost Lake
CLIENT COE

rev 1-18-80

Stage Storage



1/2 PMF Discharge w/ stoplogs

$Q_{P_1} = 3500 \div 2 = 1750$ cfs $h_1 = 218.9$
$Sto_1 = 2530 - 1350 = 1180$ a-f 5.4"

$Q_{P_2} = 1750\left(1 - \frac{5.4}{9.5}\right) = 758$ $h_2 = 217.5$
$Sto_2 = 2190 - 1350 = 840$ a-f or 3.83"

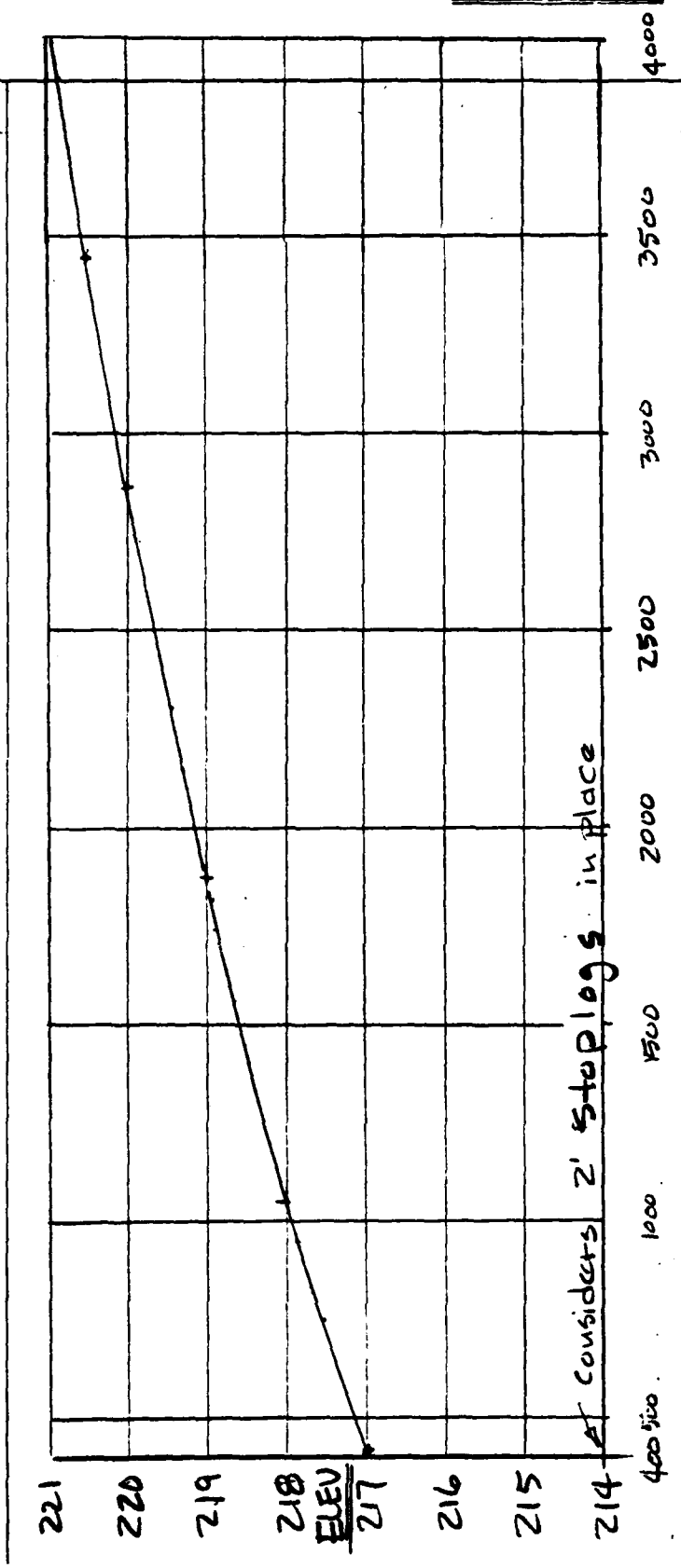
$Q_{P_3} = 1750\left(1 - \frac{9.62}{9.5}\right) = 900 \pm$ cfs $H_3 = 217.8$

Dam over-topped by 1.8 ft
w/o Stoplogs $H_3 \simeq 217.5 \pm$

JOB NO. 79.206.1
DATE 11-6-79
BY MA
CH'D BY FDD

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON — WEST HARTFORD

SHEET NO. D 6
JOB Dams
SUBJECT Lost Lake
CLIENT COE



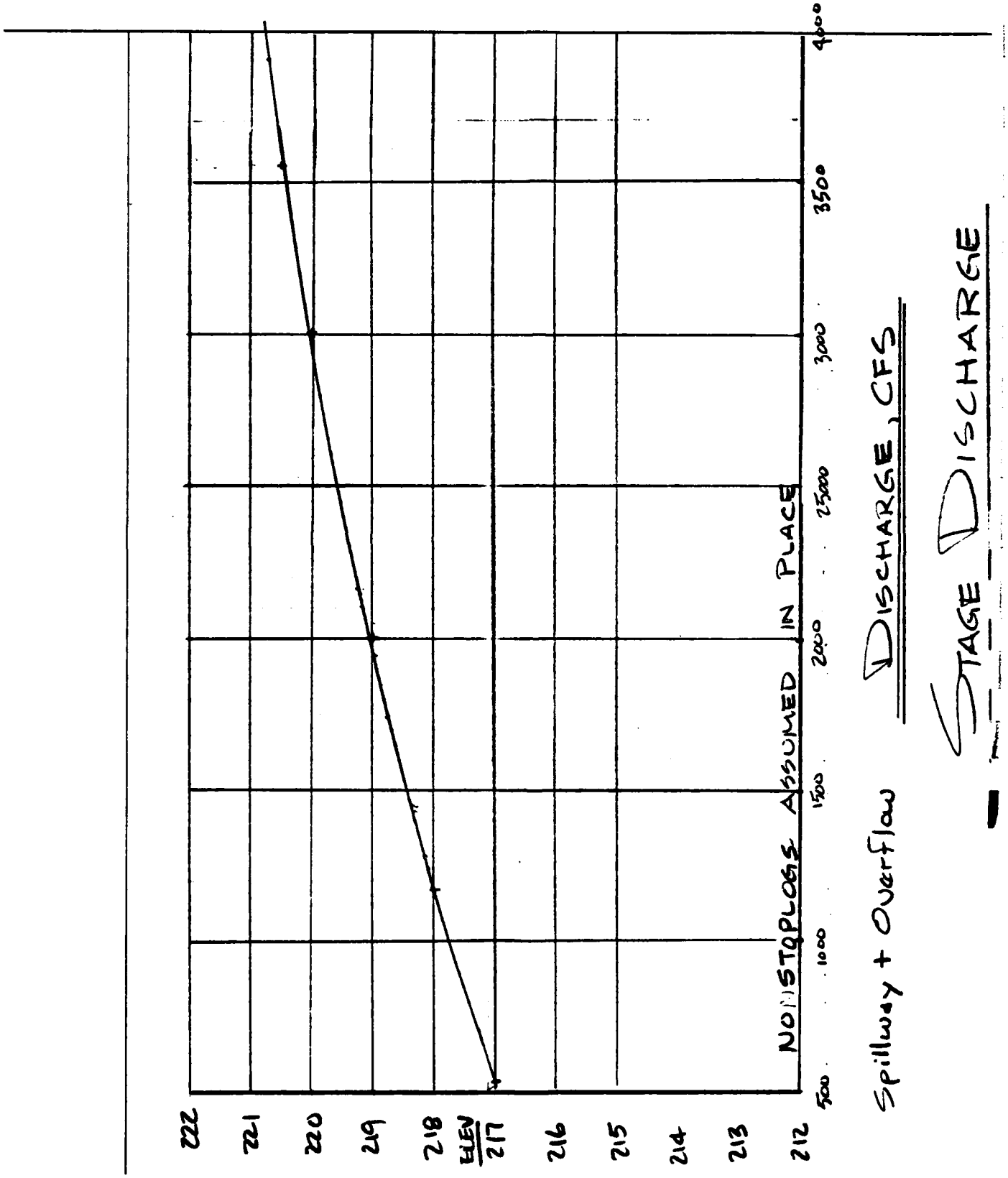
STAGE DISCHARGE

Spillway + Overflow

JOB NO. 79.206.1
DATE 11-21-79
BY MA
CH'D BY FDD

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON — WEST HARTFORD

SHEET NO. D 7
JOB DAMS
SUBJECT LOST LAKE
CLIENT COE



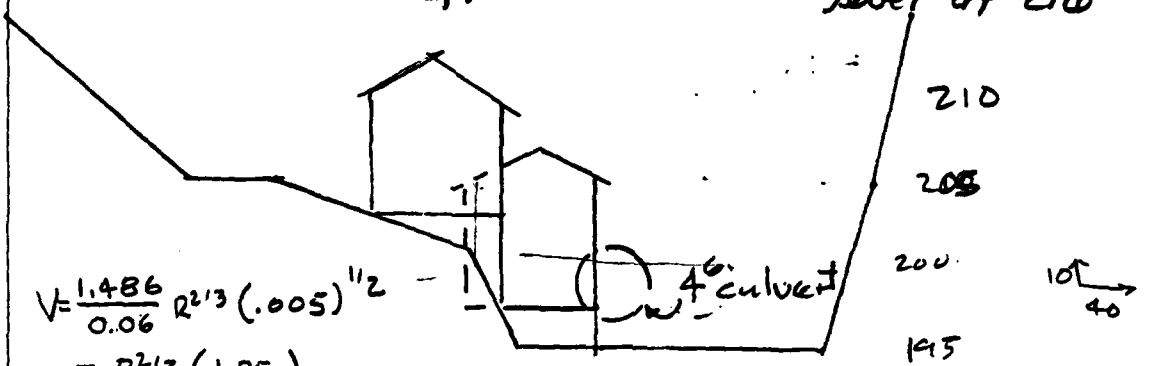
JOB NO. 79.206.1
DATE 11-6-79
BY MA
CH'D BY FDD
1-18-80

HH&B HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON — WEST HARTFORD

SHEET NO. D8
JOB Dams
SUBJECT Cost Lake
CLIENT COE

Std 4+00 $Q_F = \frac{8}{27} \times (.4 \times 80)\sqrt{32.2} \times (10)^{1.5}$

Q_F = 1700 cf initial water level at 216



$V = \frac{1.486}{0.06} R^{2/3} (.005)^{1/2}$

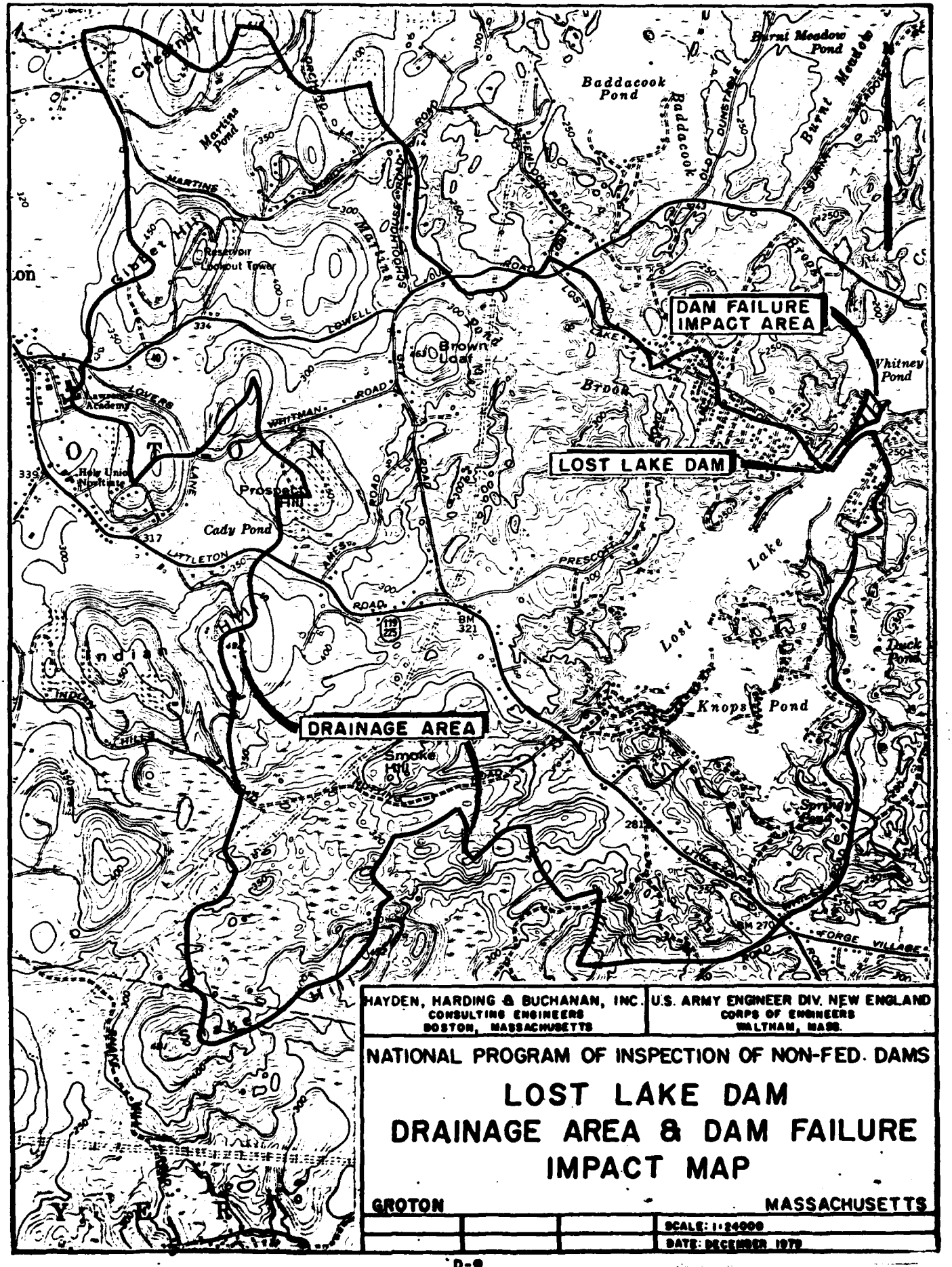
$= R^{2/3}(1.75)$

Channel Slope = $\frac{195 - 191}{800'} = 0.005$ ft/ft

Q_F = 1,700 cfs.

D	WP	A	$R^{2/3}$	1.75	V	Q
5	85	400	2.8	1.75	5.	2,000
10	150	925	3.38	"	5.9	5,480
15	200	1800	4.36	"	7.6	13,730
17	215	2200	4.75	"	8.3	18,290

Could assume road embankment at 3+00 has failed. These two homes would be damaged. IF the roadway did not fail, these homes would still be damaged.


DAM FAILURE IMPACT AREA
LOST LAKE DAM
DRAINAGE AREA
Baddacook Pond
Burnt Meadow Pond
Martins Pond
Brown Loaf
Whitney Pond
Cady Pond
Prospect Hill
Knops Pond
Lost Lake
Smoke Hill
Gibbet Hill
Reservoir
Lookout Tower
Lawrence Academy
Holy Union Monastery
Spring Pond
Duck Pond
FORGE VILLAGE
GROTON
LOWELL
LOVERS
LANE
WHITMAN
ROAD
LITTLETON
PRESCOTT
MARTINS
HEMLOCK
SCHOOLHOUSE
OLD DUNSTABLE
BM 321
BM 270
119
225
HAYDEN, HARDING & BUCHANAN, INC.
CONSULTING ENGINEERS
BOSTON, MASSACHUSETTS
U.S. ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS
LOST LAKE DAM
DRAINAGE AREA & DAM FAILURE IMPACT MAP
GROTON
MASSACHUSETTS
SCALE: 1:24000
DATE: DECEMBER 1979

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

STATE	IDENTITY NUMBER	DIVISION	STATE	COUNTY	CONGR DIST.	STATE	COUNTY	CONGR DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY | MO | YR
MA	808	NED	MA	017	05				LOST LAKE DAM	4236.0	7131.1	28DEC79

POPULAR NAME	NAME OF IMPOUNDMENT
	LOST LAKE

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	DIST FROM DAM (MI.)	POPULATION
01	06	MARTINS POND BROOK	GROTON	0	5100

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUC HEIGHT (FT.)	HYDRAU HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT.)	IMPOUNDING CAPACITIES NORMAL (ACRE-FT.)	DIST	OWN	FED R	PRV/FED	SCS A	VER/D
REPGOT	1950	R	10	10	1809	1350	NED	N	N	N	N	

REMARKS
21 CONCRETE 22 APPROX SPILLWAY RECONSTRUCTION

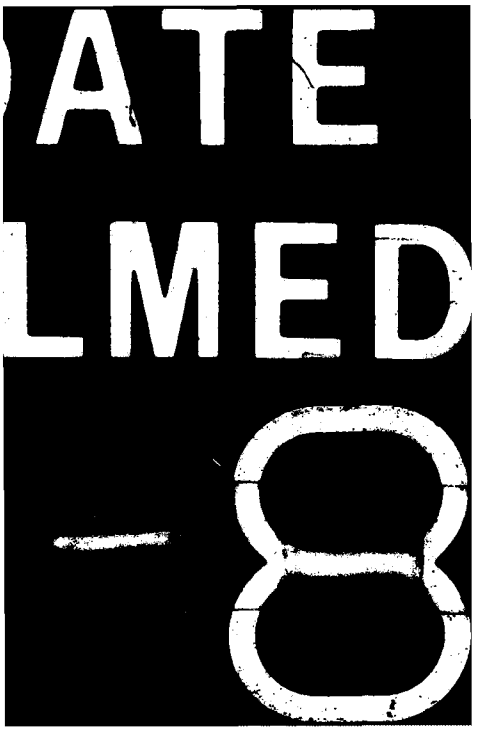
G/S MAS	SPILLWAY CREST LENGTH	SPILLWAY TYPE	SPILLWAY WIDTH (FT.)	MAXIMUM DISCHARGE (CFS)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
1	80	U	12	200												

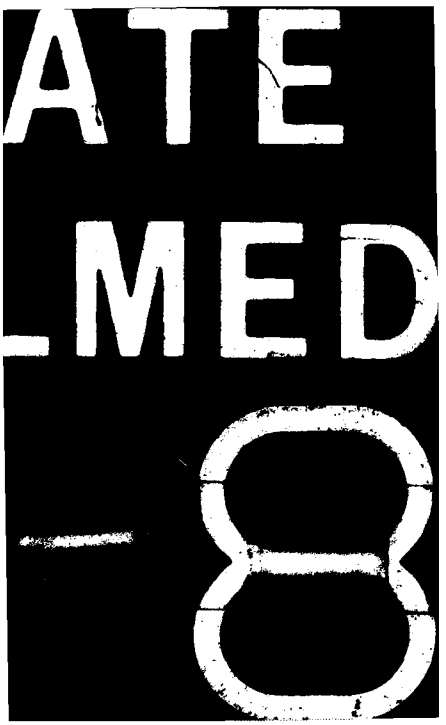
OWNER	ENGINEERING BY	CONSTRUCTION BY
LOST LAKE WATER COMMITTE	UNKNOWN	UNKNOWN

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	NONE

INSPECTION BY	INSPECTION DATE DAY | MO | YR	AUTHORITY FOR INSPECTION
HAYDEN, HARDING & BUCHANAN, INC.	05NOV79	P.L. 92-367

REMARKS


ATE
LMED
-8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